



IBS Center for Molecular Spectroscopy and Dynamics

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# Seminar

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■ **SPEAKER**

Prof. Han Seb Moon (Department of Physics, Pusan National University)

■ **TITLE**

Programmable multidimensional quantum states via space-division multiplexing of a long-coherent single photon from a warm  $^{87}\text{Rb}$  atomic ensemble

■ **ABSTRACT**

The high-dimensional encoding of single photons can offer various possibilities for enhancing quantum information processing. This work experimentally demonstrates the quantum interference of an engineered multidimensional quantum state through the space-division multiplexing of a heralded single-photon state with a spatial light modulator (SLM) and spatial-mode mixing of a single photon through a long multimode fiber (MMF). In our experiment, the heralded single photon generated from a warm  $^{87}\text{Rb}$  atomic ensemble was bright, robust, and long-coherent. The programmable multidimensional spatial quantum state of the long-coherent single photon was transported through a 4-m-long MMF and arbitrarily controlled using the SLM. We observed the quantum interference of a single-photon multidimensional spatial quantum state with a visibility of  $>95\%$ . These results may have potential applications in quantum information processing, for example, in photonic variational quantum eigensolve with high-dimensional single photons and realizing high information capacity per photon for quantum communication.

■ **DATE AND VENUE**

November 15, 2022 (Tuesday, 16:00 - 17:00)  
Seminar Room A (116)

■ **LANGUAGE**

Korean

■ **INVITED BY**

Associate Director Wonshik Choi